

Why Ergonomics? Communicating the Value to Business Stakeholders

September 10, 2020





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Today's Speakers



Josiah Allen Senior Consultant & Ergonomics Engineer VelocityEHS | Humantech



Blake McGowan Director of Research & Ergonomics Engineer VelocityEHS | Humantech



WHY ERGONOMICS? Communicating the Value to Business Stakeholders

Presented by: Blake McGowan, CPE VelocityEHS | Humantech

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Ergonomics done right.[®]

- Ergonomics Training
- Engineering and Design
- Program Management
- Workplace Assessments
- Software Solutions



Blake McGowan, CPE



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Value of Ergonomics

- Reminder: Ergonomics Optimizes Human Performance
- Benefactors & Benefits
- Social & Financial Cost of Poor Ergonomics
- Why Should Health & Safety Care?
- Why Human Resources Should Care?
- Why Should Operations Care?
- Why the C-Suite Should Care?



REMINDER: ERGONOMICS

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Fundamentals - Definition of Ergonomics

Ergonomics (or human factors) is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance.



International Ergonomics Association (IEA) and Human Factors & Ergonomics Society (HFES).

Optimized Human Performance





Is this Part of the Problem?

The goal of ergonomics is to **prevent soft tissue injuries and musculoskeletal disorders** (MSDs) caused by sudden or sustained exposure to force, vibration, repetitive motion, and awkward posture.



Centers of Disease Control and Prevention (CDC) and National Institute for Occupational Safety and Health (NIOSH).

Is this Part of the Problem?

An ergonomics program is a systematic approach and a management system that is designed to **reduce risk from ergonomic hazards in the workplace**.



Canadian Centre for Occupational Health & Safety (CCOHS).

BENEFACTORS & BENEFITS

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BENEFACTORS & BENEFITS



Dul J, Bruder R, Buckle P, Carayon P, Falzon P, Marras WS, Wilson JR, van der Doelen B. (2012). A strategy for human factors/ergonomics: developing the discipline and profession. Ergonomics. 2012;55(4):377-95.

Benefits (or Value) & Impact



Dul J, Bruder R, Buckle P, Carayon P, Falzon P, Marras WS, Wilson JR, van der Doelen B. (2012). A strategy for human factors/ergonomics: developing the discipline and profession. Ergonomics. 2012;55(4):377-95.

SOCIAL & FINANCIAL COST OF POOR ERGONOMICS

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Global Burden of Disease - MSDs

Cause	Global	High-Income Asia Pacific	Western Europe	Australasia	High-income North America	Central Europe	Southern Latin America	Eastern Europe	East Asia	Tropical Latin America	Central Latin America	Southeast Asia	Central Asia	Andean Latin America	North Africa and Middle East	Caribbean	South Asia	Oceania	Southern sub-Saharan Africa	Eastern sub-Saharan Africa	Central sub-Saharan Africa	Supervision of the second second second
Ischaemic heart disease	1	3	2	2	1	4	E.	- F	3	1	2	:31	3	(4)	1	2	4	5	14	21	19	1
Lower respiratory infections	2	2	21	30	21	17	6	13	15	7	16	4	2	1	-5	12.	1		2	3	4	
Cerebrovascular disease	3	1	3	5	7	2	31	2	-1	641	11	1	13	41	14	01	12	11	7	16	14	ľ
Diarrhoeal diseases	4	46	52	53	48	77	44	49	49	26	14	9 D	18	12 12	11		3	al	3	4	-24	
HIV/AIDS	5	108	59	87	37	72	34	4	38	12:	13	11	31	13	58	9	17	9	3	1.	5	
Low back pain	6	2	1	19	E	3.4	21	3	15	1	7	7	7	5	2	13	10	14	15	17	23	l
Malaria	2	163	162	157	155	163	166	163	169	145	154	22	152	142	66	58	44	5	20	2	1	
Preterm birth complications	8	58	44	29	26	37	12	35	27	9	9	11	8	6	8	11	2	121	6	5	6	
Chronic obstructive pulmonary disease	9	18	1	3	7	7	7	10	1	10	16	9	114	18	13	22	- 5	18	9	20	-20	ľ
Road injury	10	16	12	9	10	8	5	1	34	1.53	4	5	15	2	. 6	10	11	15	13	11	12	l
Major depressive disorder	11	12	4	-41	5	5	4	5	.8	6	5	-	6	3	3	7	14	12	10	13	17	
Neonatal encephalopathy*	12	84	66	50	54	.66	42	40	24	20	20	12	14	9	18	15	.0	19	12	9	10	
Tuberculosis	13	42	107	123	124	55	65	17	37	46	-44	2	15	21	33	17	-8	4	4	7	7	
Diabetes	14	10	10	-14	8	9	9	15	0.0	a	3	10	12	15	9	6	16	123	8	29	28	l
Iron-deficiency anaemia	15	39	84	36	317	29	27	29	32	18	17	14	13	1	10	15	2	23	11	12	11	
Sepsis and other infectious disorders of the newborn baby	16	119	120	113	- 99	114	49	87	182	27	29	34	53	- 37-	22	14	1	25	29		13	ſ
Congenital anomalies	17	41	35	27	30	32	13	25	16	11	10	16	10	10	1	16	15	17	17	18	8	
Self-harm	18	5	15	18	14	11	14	- fa	13	29	25	29	14	32	38	33	13	26	27	32	37	l
Falls	19	11	6	2	15	6	17	14	11	23	28	21	20	28	19	21	20	32	43	33	32	Ĩ
Protein-energy malnutrition	20	13.4	119	129	116	122	80	123	99	59	34	49	68	35	37	32	19	20	36	6	3	ľ
Neck pain	21	4		10	9	14	10	18	9	13	18	25	17	16	15	23	32	35	21	31	33	1
Trachea, bronchus, and lung cancers	22	6	5	8	4	4	15	9	6	30	39	26	28	48	28	27	49	58	45	95	.75	ſ
Cirrhosis of the liver	23	17	19	37	-16	10	16	110	21	19	12	15	9	22	17	34	22	16	37	30	-27	1
Other musculoskeletal disorders	24		9	6	6	13	8	16	14	16	15	23	19	19	21	24	31	27	26	35	36	1
Meningitis	25	91	107	92	- 91	84	59	78	73	52	45	37	34	39	30	29	21	10	24	10	9	ſ
Anxiety disorders	26	21	14	12	13	15	11	30	26	14	19	27	16	12	12	20	26	33	30	25	29	
Interpersonal violence	27	70	65	60	25	42	22	12	47	2	1	24	24	3.4	32	12	34	31	5	23	21	1
Asthma	28	26	23	15	22	33	24	42	53	15	26	18	40	20	20	19	25	100	22	26	26	ĺ

Horton, R. 2010. "Understanding Disease, Injury, and Risk." Lancet 2012 (380): 2053–2054

Murray, et al., (2012). Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. Lancet. 2012 Dec 15;380(9859):2163-96.

Global Burden of Disease - MSDs



Horton, R. 2010. "Understanding Disease, Injury, and Risk." Lancet 2012 (380): 2053–2054

Murray, et al., (2012). Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. Lancet. 2012 Dec 15;380(9859):2163-96.

Global Burden of Disease - MSDs

Leading causes 1990		Leading causes 2005	% change number of YLDs 1990-2005	% change all-age YLD rate 1990-2005	% change age standardised YLD rate 1990-2005	2- 1	Leading causes 2015	% change number of YLDs 2005-15	% change all-age YLD rate 2005-15	% change age- standardised YLD rate 2005-15
1 Lower back and neck pain	/	1 Lower back and neck pain	34-5	9.4	-1.8		1 Lower back and neck pain	18-6	4.9	-2-1
2 Iron-deficiency anaemia		2 Sense organ diseases	39-4	13-4	2.1		2 Sense organ diseases	25-2	10-8	0.0
3 Sense organ diseases	14.4	3 Iron-deficiency anaemia	14.8	-6.6	-0.6	1.11	3 Depressive disorders	18-2	4.5	1.0
4 Depressive disorders		4 Depressive disorders	32-9	8-0	0.6		4 Iron-deficiency anaemia	-3-8	-14.9	-11-6
5 Skin diseases	0	5 Skin diseases	21.9	-0-8	0.5		5 Skin diseases	11.7	-1.2	0.4
6 Migraine		6 Migraine	29-7	5.5	-0.3	hand	6 Diabetes	32.5	17-2	5.4
7 Other musculoskeletal disorders		7 Other musculoskeletal disorders	51-8	23.4	13.5	·	7 Migraine	15.3	2.0	0.8
8 Anxiety disorders		8 Diabetes	69-2	37.6	20.7	1000	8 Other musculoskeletal disorders	20-5	6.6	1.3
9 Diabetes		9 Anxiety disorders	26-1	2.6	-1.5		9 Anxiety disorders	14-8	1.5	1.0
10 Asthma	-	10 Asthma	2-6	-16.5	-15.5		10 Oral disorders	22.4	8.2	-0.2
			and the second sec	a state of the second se		and the second se		and the second se		

Vos, et al. (2016). Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990-2015: a systematic analysis for the Global Burden of Disease Study 2015. Lancet. 2016 Oct 8;388(10053):1545-1602.

Can Ergonomics Help Solve the Opioid Crisis?



Dale, et al. (2019). Can Ergonomics Programs Help Solve the Opioid Crisis? Preventing Pain is the Key. The Synergist (AIHA). 2019 May.

Opioids & Musculoskeletal Disorders

Although many factors have contributed to the opioid crisis, the role of workplace musculoskeletal injuries has been overlooked.

• 57% of those who died from opioid-related deaths had at least one prior workplace MSD.

Cheng M, Sauer B, Johnson E, Porucznik C, Hegmann K. Comparison of opioid-related deaths by work-related injury. Am J Ind Med. 2012;56(3):308-316.

Opioids & Musculoskeletal Disorders



- **FIGURE 1** Average annual rate of opioid-related overdose deaths among Massachusetts workers by occupation-specific injury and illness rate category, 2011-2015*
- Hawkins, Roelofs, Laing, & Davis (2019). Opioid-related overdose deaths by industry and occupation—Massachusetts, 2011-2015. American Journal of Industrial Medicine. Volume62, Issue10. October 2019. Pages 815-825. <u>https://doi.org/10.1002/ajim.23029</u>.

- Highest occupations:
 - construction,
 - farming, and
 - material movers.



Silverstein B, Evanoff B. Musculoskeletal disorders. In: Levy BS, Wegman DH, Baron SL, et al., eds. Occupational and environmental health: recognizing and preventing disease and injury. New York, NY: Oxford University Press, 2011:335–65. 3

BLS [Bureau of Labor Statistics]. 2015. "Nonfatal Occupational Injuries and Illnesses Requiring Days Away from Work, 2014." November 19, 2015. Accessed January 12, 2016. Schneider E, Irastorza X. OSH in figures: work-related musculoskeletal disorders in the EU—facts and figures. Luxembourg: European Agency for Safety and Health at Work (EU-OSHA), 2010

Cost of MSDs - USA



AAOS [American Academy of Orthopaedic Surgeons]. 2008. The Burden of Musculoskeletal Diseases in the United States: Prevalence, Societal, and Economic Cost. Executive Summary. Rosemont, IL: AAOS.

Cost of Leading Types of MSDs





\$29,000 -\$33,000

\$22,500 - \$76,000

OSHA's "\$afety Pays.

Silverstein B, Evanoff B. Musculoskeletal disorders. In: Levy BS, Wegman DH, Baron SL, et al., eds. Occupational and environmental health: recognizing and preventing disease and injury. New York, NY: Oxford University Press, 2011:335–65. 3

Leading Cause of Workplace Injuries



LEADING CAUSE OF WORKPLACE INJURIES

Liberty Mutual Workplace Safety Index 2020

Risk Control services from Liberty Mutual Insurance

	Cost Percent billions total
U.S. businesses spend	Total cost of the most disabling workplace injuries: 1. \$13.98 23.5% Overexertion involving outside sources (Handling objects)
dollars a week on	\$59.59 billion 2. \$10.84 18.2% Falls on same level
serious, nonfatal workplace injuries.	Cost of top 10 most disabling workplace injuries: \$52.93 billion 3. \$6.12 10.3% Struck by object or equipment (Being hit by objects)
(1999) (1997) (1997) (1997) (1997) (1997) (1997)	4. \$5.71 9.6% Falls to lower level
	5. \$4.69 7.9% Other exertions or bodily reactions
	6. \$3.56 6.0% Roadway incidents involving motorized land vehicle (Vehicle crashes)*
	7. \$2.06 3.5% Slip or trip without fall
	8. \$2.05 3.4% Repetitive motions involving microtasks
	9. \$2.00 3.4% Struck against object or equipment (Colliding with objects)
	1 2 3 4 5 6 7 8 9 10. \$1.92 3.2% Caught in or compressed by equipment or objects (Running equipment or machines)

* Typically involving a car or truck

LEADING CAUSE OF WORKPLACE INJURIES

Workplace Safety Indices by industry: insights and methodology

Risk Control services from Liberty Mutual Insurance



LEADING CAUSE OF WORKPLACE INJURIES



The 10 leading causes of workplace injuries in 2002

The 10 leading causes of serious workplace injuries account for 88 percent of the \$49.6 billion cost of serious workplace injuries in 2002.

WHY SHOULD HEALTH & SAFETY CARE?

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first aid cases



modified duty cases

√75%

√93%

long-term sickness absences

↓ 23%

Casual absenteeism

duration long-term sickness absences

Tompa E, Dolinschi R, Natale J. (2013). Economic evaluation of a participatory ergonomics intervention in a textile plant. Appl Ergon. 2013 May;44(3):480-7.

Site Initiative

Economic Benefit of Deploying a Participatory Ergonomics Progam (2 year period)



Tompa E, Dolinschi R, Natale J. (2013). Economic evaluation of a participatory ergonomics intervention in a textile plant. Appl Ergon. 2013 May;44(3):480-7.

PARTICIPATORY Corporate Initiative

reduction in ergonomics recordable injuries

reduction in lost-time cases

reduction in workers compensation claims

Ergonomic Recordable Incident Rates: 2001 - 2010



25%

70%

50%

50%

reduction in lost-time claims cost

Larson N, Wick H. (2012). 30 years of ergonomics at 3M: a case study. Work. 2012;41 Suppl 1:5091-8.

MACRO CORPORATE INITIATIVE



relative risk reduction

injuries per 100 person-years

Cantley LF, Taiwo OA, Galusha D, Barbour R, Slade MD, Tessier-Sherman B, Cullen MR. (2013). Effect of systematic ergonomic hazard identification and control implementation on musculoskeletal disorder and injury risk. Scand J Work Environ Health. 2014 Jan;40(1):57-65.

MACRO Corporate Initiative

high risk job exposures were eliminated through engineering and administrative controls

reduction in ergonomics case incident rate

74% reduction in restricted-time case rate

reduction in lost-time case incident rate

Larson N, Wick H. (2012). 30 years of ergonomics at 3M: a case study. Work. 2012;41 Suppl 1:5091-8.

73%

55%

40%

MACRO CORPORATE INITIATIVE



Improved employee well-being

- musculoskeletal disorders
- incidence rates
- lost workdays
- restricted workdays
- workers' compensation costs
- turnover
- absenteeism
- productivity
 - quality



Goggins RW, Spielholz P, Nothstein GL. (2008). Estimating the effectiveness of ergonomics interventions through case studies: implications for predictive cost-benefit analysis. J Safety Res. 2008;39(3):339-44.

WHY SHOULD HUMAN RESOURCES CARE?

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Value of Ergonomics Process





Turnover: ↓ 23-49%

Absenteeism: 42-116%

Value of Ergonomics Process



Value of Ergonomics Process

The ergonomic condition of the workplace reflects stakeholder's respect for employees.

- To engage employees, business leaders need to simply connect oneon-one with them to establish a foundation of trust and respect.
- If the workplace is designed to meet people's needs, it demonstrates the employer's commitment and enables employees to be fully engaged in the workplace.

WHY SHOULD humaniecte OPERATIONS CARE?

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\downarrow MSD Risk = \uparrow Performance



Alabdulkarim S, Nussbaum MA, Rashedi E, Kim S, Agnew M, Gardner R. (2016). Impact of task design on task performance and injury risk: case study of a simulated drilling task. Ergonomics. 2016 Aug 31:1-16.

Improved Manufacturing Performance

Participatory ergonomic intervention shows statistically significant improvements in performance outcomes:

Increase first-time quality production

5% Increase productivity efficiency

Tompa E, Dolinschi R, Natale J. (2013). Economic evaluation of a participatory ergonomics intervention in a textile plant. Appl Ergon. 2013 May;44(3):480-7.

1%



Ann-Christine Falck, Roland Örtengren and Dan Högberg. (2010). The impact of poor assembly ergonomics on product quality: A cost-benefit analysis in car manufacturing. Human Factors and Ergonomics in Manufacturing & Service Industries, Volume 20, Issue 1, pages 24–41, January/February 2010.

Ann-Christine Falck, Roland Örtengren, Mikael Rosenqvist. (2014). Assembly failures and action cost in relation to complexity level and assembly ergonomics in manual assembly (part 2). International Journal of Industrial Ergonomics 44 (2014) 455-459.

Impact of Fatigue on Manufacturing Quality

Fatigue is an intermediary factor between HF and manufacturing quality.

• Fatigue accounts up to 42% of the variance in quality deficits.



Yung M, Kolus A, Wells R, & Neumann P. (2019). Examining the fatigue-quality relationship in manufacturing. Applied Ergonomics. Volume 82, January 2020, 102919. https://doi.org/10.1016/j.apergo.2019.102919

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WHY SHOULD THE C-SUITE CARE?

tech

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Improved human capital management

The Materiality of Human Capital to Corporate Financial Performance



Human Capital management is material to company financial performance.

- Term understood by Senior Management Teams and Financial Investors.
- Skills, knowledge, and abilities employees bring to their work viewed in terms of their value or cost to the company.

Bernstein, Aaron and Larry Beeferman, The Materiality of Human Capital to Corporate Financial Performance, Pensions and Capital Stewardship Project, Labor and Worklife Program, Harvard Law School, 2015

Impact on Stock Performance



Figure 1. Portfolio starting at five winners versus S&P 500.



Cumulative stock performance (in %) of Koop Award Winners compared with the S&P 500 Index (2001-2014).

Fabius R, Thayer RD, Konicki DL, Yarborough CM, Peterson KW, Isaac F, Loeppke RR, Eisenberg BS, Dreger M. (2013). The link between workforce health and safety and the health of the bottom line: tracking market performance of companies that nurture a "culture of health". J Occup Environ Med. 2013 Sep;55(9):993-1000.

Goetzel RZ, Fabius R, Fabius D, Roemer EC, Thornton N, Kelly RK, Pelletier KR. (2016). The Stock Performance of C. Everett Koop Award Winners Compared With the Standard & Poor's 500 Index. J Occup Environ Med. 2016 Jan;58(1):9-15.

Importance of (Human) Sustainability



REPORTING

FLASH REPORTS&P

HIGHLIGHTS

In the just-completed analysis of the 2019 publication year, G&A analysts determined that 90% of the S&P 500 companies are now reporting, while the non-reporters now make up a percentage of only S&P 500 COMPANIES 10%. The analysis included a breakdown of reporting and non-reporting by GICS® classification.



Governance & Accountability Institute, Inc. 2020 Research. (2020). Trends on the sustainability reporting practices of S&P 500 Index companies. 2020 Flash Report S&P500.

Impact on corporate credit rating

4%

of all credit changes are influenced by social factors



human capital management and safety management are the most important social factors impacting credit quality



of these changes were negative or downgrades in credit rating. A downgrade typically results in a 10% to 20% drop in stock price.

De La Gorce N, Williams J, Wilkens M, Martin ND, and Burks B. (2018). How Social Risk And Opportunities Factors Into Global Corporate Ratings. S&P Global Market Intelligence.

POSITIVE WELL-BEING & PERFORMANCE OUTCOMES

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Benefactors & Benefits



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Benefactors & Benefits



Dul J, Bruder R, Buckle P, Carayon P, Falzon P, Marras WS, Wilson JR, van der Doelen B. (2012). A strategy for human factors/ergonomics: developing the discipline and profession. Ergonomics. 2012;55(4):377-95.

COMMUNICATING THE JUTATION VALUE OF ERGONOMICS TO STAKEHOLDERS

BLAKE MCGOWAN MSC, CPE September 10th, 2020 | Ann Arbor, MI

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- The Forum is virtual this year!
 - 3 days of content designed to meet the needs of a diverse audience
 - Tuesday October 20
 - Wednesday October 21
 - Thursday October 22
 - Shorter days, starting at 11am 4pm
- Continued focus on the management challenges of leading EHS&S
 - Special emphasis on the challenges related to COVID-19
 - Variety of session formats with opportunities for engagement and discussion
 - Small group networking discussions to deliver meaningful connection



New Reports from NAEM



- Impact of COVID-19 on EHS
- Trends in Emerging Tech for EHS&S
- 2020 EHS & Sustainability Salaries
- 2020 Staffing, Structure & Budgets
- How COVID-19 is Impacting Corporate Sustainability Agendas

All available @ NAEM.org/research

Great Webinars!

Sept 15



How to Make the Business Case for Resources to Manage Your Company's COVID-19 Response

Sept 24



How COVID-19 is Impacting Corporate Sustainability Agendas

Oct 6



Leveraging Digital Solutions to Ensure Operational Continuity During COVID-19



More to be announced! Visit our website for updates, more information & registration <u>www.naem.org</u>

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 - LinkedIn: https://www.linkedin.com/company/naem



Thank you for Attending!



A recording will be available in 3-4 days. You will receive an email once it's posted to our site.



Have a safe & healthy day!

